

ANNUAL REPORT FOR THE YEAR ENDING DECEMBER 1939

BY B.P. THOMAS, CHIEF ENGINEER

AND

R. H. THOMSON, CONSULTING ENGINEER

TO THE JOINT BOARD,  
INTER-COUNTY RIVER IMPROVEMENT COMMISSION,  
KING AND PIERCE COUNTIES, WASHINGTON.

GENTLEMEN:

We have the honor to submit for your consideration a resume of the work completed upon the Inter-County River Improvement during the year 1939.

This year witnessed no serious floods upon our rivers. In fact, the regular summer run-offs were unusually low. The extremely dry summer and the prolonged dry fall made for abnormal low water stages throughout the latter part of the year.

The major efforts of your organization were directed over this period toward bank stabilization by the use of rock riprap. To accomplish this a quarry near the Soldiers Home at Orting was operated jointly with the Pierce County Puyallup River Flood Control. In addition to this work your engineers followed closely the developments at Mud Mountain Dam and were finally rewarded by seeing the contract let for the completion of the project.

BANK STABILIZATION. In line with the recommendations made a year ago and the findings of our work of previous years we have gone entirely to rock riprap as the means of bank stabilization. This year we found that our work was sufficiently caught up in repairing those banks which heretofore had been particularly dangerous, due to the lack of any protection whatever or due to the failure of existing protection, as to permit us to branch out and start work upon those reaches of the river where a new and different type of construction, other than blanket riprap, was required. For instance, in the County Line section where the silt

and gravel burden of the river is normally deposited and where heretofore it has been customary to keep the channel open by dredging we have undertaken a scheme of control with the combined use of long groins and low dikes. These structures are placed in such a manner as to confine the stream at normal flows and even ordinary floods within a defined and established channel, but to permit the greater floods to overflow into the meander belt but so as to prevent dragging anything from within the meander belt back into the river. It is considered by this method we will keep the river scouring throughout the year in a certain and established narrow channel and thus induce the continuous lowering of the river bed within these prescribed reaches. During the higher floods silt will be deposited over those areas outside the established channel and within the meander belt. In the Auburn Section, that is that reach of the river just above the Northern Pacific Bridge, just south of Auburn, where the meander belt is quite wide and the slope steep, we are so directing the course of the main stream back and forth across this meander belt with the intention of flattening the slope and thereby reducing the scouring action of the stream.

The years work in the placement of rock riprap has been tabulated and incorporated herewith showing in detail the amount of rock placed at each particular point. This table begins with the Auburn Section and is carried throughout the extent of our jurisdiction. It shows the type of protection used at each location. In some places long groins are designated, these are used where the meander belt is wide and it is necessary to connect up the existing bank with a new established bank on the same side of the river. At other places, where it is desirable to direct the stream in a sharp turn, short groins are extended into the stream for the purpose of breaking its force at this particular point. Where the existing bank of the stream is used as the established bank and it is desired only to prevent erosion on that bank the blanket type of protection is used. This type requires the least rock. Where revetment exists and it is desirable to maintain that revetment and preserve it from further erosion small groins are placed at about thirty foot centers at the toe of the revetment. This type

is called toe groins.

In the table for each location we have also tabulated the length of the bank in feet protected by each particular job and in the adjacent column the figures showing the number of cubic yards required per lineal foot of bank. In addition we have shown the total distance from the quarry where the rock is produced to the particular job under consideration, as the trucks drive it; and also the cubic yard miles which is the product of the total amount of rock in cubic yards multiplied by the miles hauled for each location.

This table designated as "Table A" follows.

SECTION	LOCATION	CU.YDS.	TYPE	BANK PROTECTED LIN. FEET	UNIT PROTECTION C.Y. PER LIN. FT.	HAUL MILES	YARD MILES
AUBURN	L.B. Above Bridge	498	Blanket	244	2.00	15.6	7613
	R.B. Blaker Place						
	Groin No. 1	2502	Long Groin 400'	800	3.14	16.0	
	" " 2	304	Short "			16.0	
	" " 3	362	" "	600	2.50	16.0	
	" " 4	428	" "			16.0	
	Blanket	410	Blanket			16.0	
	Sub-total.....	4006			2.85		64096
			1616 = 7.262.30				
			1616				
COUNTY LINE	L.B. Groin A	422	Long Groin			15.5	
	" B	328	" "			15.5	
	" C	486	" "			15.5	
	" D	506	" "	800	3.25	15.5	
	" E	340	" "			15.5	
	Bone Yard	64	Blanket	50	1.08	15.6	
	Groin No. 1	1518	Low Dike	1000	1.52	15.5	
	Sub-total.....	4154					64367
COUNTY LINE	R.B. Groin at Lane	324	Dike	100	3.24	16.0	5184
	R.B. Opposite Shop						
	Groin 0	228	Short Groin				
	" 1	80	" "				
	" 2	106	" "				
	" 3	92	" "				
	" 4	82	" "				
	" 5	72	" "				
	" 6	68	" "				
	" 7	58	" "				
	" 8	60	" "				
	" 9	78	" "				
	" 10	100	" "				
	" 11	46	" "				
	" 12	74	" "				
	" 13	104	" "				
	" 14	50	" "				
	" 15	44	" "				
	" 16	80	" "				
	Sub-total.....	1422		1000	1.42	15.5	22041

$5900 \times 1.616 = \$9,534.40$

TABLE "A"

SECTION	LOCATION	CU.YDS.	TYPE	BANK PROTECTED LIN. FEET	UNIT PROTECTION C.Y. PER LIN. FT.	HAUL MILES	YARD MILES
<u>DIERINGER</u>	L.B. Shafer Place	<u>188</u>	Blanket	100		15.0	2820
	R.B. Briar Patch		"				
	1000' below Stewart Br.	26	"				
	Blanket 1	222	"				
	" 2	242	"				
	" 3	66	"				
	Groin 1	320	Long Groin				
	" 2	112	"				
	" 3	52	"				
	" 4	116	"				
	" 5	228	"				
	" 6	254	"				
	" 7	24	Toe Groin				
	" 8	16	"				
	" 9	16	"				
	" 10	16	"				
	" 11	16	"				
	" 12	14	"				
	" 13	20	"				
	" 14	14	"				
	" 15	16	"				
	" 16	16	"				
	" 17	20	"				
	" 18	16	"				
	" 19	44	"				
	Sub-total.....	<u>1886</u>		2000'		15.0	28290
	L.B. Perfield Place	896	Blanket	600'		11.9	10662

2950.40  
2950 x 1.666 = 4767.20

TABLE "A"

SECTION	LOCATION	CU.YDS.	TYPE	BANK PROTECTED LIN. FEET	UNIT PROTECTION C.Y.PER LIN. FT.	HAUL MILES	YARD MILES
<u>ROESLI</u>	L.B. Garrett Place	<u>144</u>	Blanket	75		11.1	1508
	L.B. Puy. Above Confluence	<u>654</u>	"	600		11.1	7259
	L.B. Garbage Dump						
	Blanket 1	328	"	not complete			
	" 2	12	Long Groin )				
	Groin 1	184					
	" 2	386		" "	1400		
	" 3	110		" "			
	" 4	294		" "			
	" 5	114		" "			
	Sub-total.....	<u>1428</u>				11.3	16136
	L.B. Golf Course						
	Blanket	616	Blanket )				
	Groin 1	116	Long Groin )				
	" 2	70	" "				
	" 3	182	" "	1600			
	" 4	358	" "				
	" 5	72	" "				
	Sub-total.....	<u>1414</u>				11.7	16544
<i>3640 x 1.616 = 5882.24</i>							
<u>PUYALLUP</u>							
	R.B. Below Meridian Bridge	<u>232</u>	Toe Groin	300		12.5	2900
<i>232 x 1.616 = 374.91</i>							

TABLE "A"

SECTION	LOCATION	CU.YDS.	TYPE	BANK PROTECTED LIN. FEET	UNIT PROTECTION C.Y. PER LIN. FT.	HAUL MILES	YARD MILES
<u>MURPHY</u>	Sta. to Station						
	R.B. 237p00 - 234p25	84		300			
	208p00 - 203p85	64	Toe Groins	440			
	L.B.						
	263p00 -	144	Long "	100			
	262p00	144	" "	100			
	253p00	840	" "	250			
	250p50	744	" "	250			
	247p00 - 242p30	512	Toe "	500			
	Sub-total.....	2532	$\times 1.616 = 4.091.71$			13.1	33169
<u>RESERVATION</u>							
	R.B. 160p00 - 135p10	1224	Toe Groins	2520		15.2	18605
	131p85 - 125p35	204	" "	680		15.7	3203
	116p30 - 97p50	1024	" "	1910		16.1	16486
	87p00 - 80p00	368	" "	730		16.5	6072
	76p00 - 62p75	312	" "	1350		16.8	5242
	168	16	Toe "	Spot		15.2	243
	L.B. 164p31 - 150p00	592	Toe Groins	1460		15.0	8880
	138p00 - 134p70	64	" "	360		15.4	985
	117p30 - 96p70	600	" "	2140		16.0	9600
	86p10 - 82p10	132	" "	330		16.4	2165
	73p90 - 26p00	1358	" "	4820		17.1	23222
	Sub-total.....	5894	$\times 1.616 = 9.559.70$				
				16300			
	GRAND TOTALS.....	25662		29509	Cost per cubic yard mile	.0726	
					GRAND TOTAL		377402

It is interesting to note from this table that the work for the year has been spread pretty well over the whole length of our jurisdiction. At the end of the year we find that the improved channel from the town of Puyallup to the City of Tacoma is pretty well completed in the construction of toe groins for the protection of existing revetment. There are still some reaches where rock has not been placed. Invariably in these places the present toe is apparently in sound condition and has a considerable useful life ahead of it before rock will be required.

The Roesli Section which is that reach of the river between the towns of Sumner and Puyallup had considerable work done on it this year. There still remains about the same amount of work to be completed before the section is in first class condition. The Dieringer Section which is that reach of the river between the Inter-County office and town of Sumner still has many miles of bank which is protected only by vegetable growth.

It is interesting to note that throughout the year we hauled and placed 25,662 cubic yards of rock and that we protected 29,509 feet of bank or 5.6 miles. You will also note that the cost per cubic yard mile of haul was \$.0726.

QUARRY OPERATION: About the first of March your engineers started a joint operation with Pierce County Puyallup River Improvement under a contract with the Board of County Commissioners of that County. Under the terms of this contract the two organizations were to divide the costs of the operation of the quarry upon the basis of the rock taken by each. Your Chief Engineer was placed in charge of the joint operation for both parties to the contract.

Your attention is called to the fact that the joint operation produced and loaded on trucks from the quarry 51,869½ cubic yards of rock. The total cost of this operation was \$32,190.12.



This makes the net cost of rock on the trucks of \$.62 per cubic yard. This cost is far lower than any quarry operation we have heretofore undertaken.

Under this contract the Inter-County in general employed the men and supervised the operation of the quarry. Pierce County furnished the shovel, its operator and an oiler, and most of the materials and supplies which were used in the quarry. In the contract was written a balance due the Inter-County for work done under previous contracts, the amount of which was \$2232.55. The Inter-County River Improvement hauled all the rock used by it from the quarry on trucks working under contract at \$2.60 per hour. Pierce County used two and sometimes three or four Pierce County trucks belonging to the road district and in addition a fleet of six trucks furnished under a W P A project. The W P A equipment fund for these trucks will have been exhausted sometime in the coming February at which time it is anticipated that a balance will be struck between the two parties to the contract. You will note that at the end of 1939 the parties were not far out of balance on the contract, the Inter-County having spent about \$500 more than Pierce County and having hauled away some 1800 cubic yards less of rock. A table showing the complete operation for the year follows and is designated as Table "B".

Table "B"

QUARRY OPERATION FOR THE MONTH OF DECEMBER 1939

Table "B"

Inter-County		Pierce County	
Labor.....	\$1,182.88	Supervision.....	\$100.00
Supervision.....	150.00	Shovel Operator .....	337.30
Ind. Insurance.....	33.86	Shovel Oiler.....	218.35
Pierce County Bureau.....	11.31	Ind. Ins. & Clinic.....	13.21
	1,378.05		668.86
Miscellaneous Materials....	22.26	Gas- Oil Shovel & Comp.....	260.68
Powder.....	295.00	Miscellaneous Materials....	30.21
	317.26	Shovel Rental.....	365.00
			655.89
Total Cash Expended .....	\$ 1,695.31		\$1,324.75
Equipment Rental.....	150.00		.....
Total Expenditures.....	\$1,845.31		\$1,324.75

Powder, fuse on hand \$900.17  
pd for by I.C., to be charged against operation in 1940

	Contribution Previous Mos.	Contribution December	Total	Rock Taken Previous Mos c.y.	Rock Taken December c.y.	Total c.y.
Inter-County	13,508.95	1,845.31	15,354.26	21,908	3,074	24,982
Pierce County	15,511.11 29,020.06	1,324.75 3,170.06	16,835.86 32,190.12	24,165 46,073	2,628 5,702	26,793 51,775
Pierce County Road District Previous Months.....						94 1/2 51,869 1/2
Total Cost to Date.....		\$32,190.12		Rock Taken to Date.....	51,869 1/2 c.y.	

Balance Sheet on Quarry Operation.

Expenditures	Inter-County	Pierce County
Disbursements to December 31st, 1939	\$ 15,354.26	\$ 16,835.86
Balance carried from 1938	2,232.55	
Royalty charge One Cent per cubic yard		249.782
Total.....	\$ 17,586.81	\$ 17,085.68

INTER COUNTY RIVER IMPROVEMENT ROCK REPORT  
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Table "C"

Total Rock Hauled during 1939	25,662 cubic yards
Truck Rental during year (Includes Waste Haul)	\$27,417.00
Total Yard Miles	377,402
Cost per c.y. miles = $\frac{27,417}{377,402}$	= \$.0726
Cost to haul Rock = $\frac{27,417}{25,662}$	= \$1.07 per cubic yard
One c.y. weighs 3500 lbs.	= 1.75 tons

$$\frac{.0726}{1.75} = $.0416 = \text{Cost per ton mile}$$

$$\frac{1.07}{1.75} = \$0.61 \text{ Average Cost per ton to haul.}$$

$$\text{Average Haul} = \frac{377402}{25662} = 14.75 \text{ miles}$$

.....

Cost per c.y. to Quarry	\$0.6207
Cost " " to Haul	1.07
Cost " " to Place	.0567
	$\frac{1456.51}{25662}$

Total Cost per c.y. in place \$1.7474

.....

Grand Total	Cu. Yds.	Bank Protected	Unit c.y. /'	Cost / lin. ft.
Tee Groins	5894	16300	0.36	\$0.63
Other Types	19768	15209	1.49	2.60

A study of the quarry and rock hauling operation is incorporated herewith identified as Table "C". It shows some very interesting information. For instance, the cost per ton mile to haul this rock is a little over four cents, an extremely low cost considering that trucks must return to the quarry empty. It is to be noted that the average haul for the Inter-County River Improvement is  $14 \frac{3}{4}$  miles from the quarry. Under the price of \$2.60 per hour which we pay the truck owners and upon the understanding that the trucks are to make five trips for an eight hour day the optimum cost to haul rock would be \$1.04 per yard to the river. The actual cost throughout the year amounted to \$1.07. The difference of three cents per cubic yard is the cost of disposing of waste by trucks in the quarry.

In addition to the cost of quarrying rock and the cost of hauling it we spent \$1456.00 during the year in the placement of the rock which amounts to  $5 \frac{2}{3}$  cents per cubic yard. This makes a total cost of producing rock and placing it on the river of a \$1.75 per cubic yard. This figure compares with \$2.10 to \$2.75 per yard which we have heretofore used in the operation of the other quarry.

The unit cost of protecting the existing concrete revetment by the construction of rock toe groins amounts to 63 cents per lineal foot, as compared with \$1.00 and \$1.50, the actual cost when we were using piling and brush. The lineal cost per foot of other types of protection, an average which includes both the blanket type and groins and dike system amounts to \$2.60 per lineal foot of bank as compared to a unit cost varying from \$8.00 to \$12.00 per lineal foot used when concrete revetment was in vogue.

Table "D" shows the distance from the Quarry to each particular location on the river.

Table "D" follows on next page.

DISTANCE FROM SOLDIER'S HOME QUARRY TO  
LOCATIONS ON I.C.R.I.  
.....

Table "D"

AUBURN SECTION	MILES
Blaker Place Right Bank	16.0
Left Bank Above Bridge	15.6
COUNTY LINE SECTION	
Left Bank Opposite High Pole	15.5
Right Bank at High Pole	15.5
DIERINGER SECTION	
Shafer Place Left Bank	15.0
Briar Patch Right Bank	15.0
Purfield Place Left Bank	11.9
ROESLI SECTION	
Garrett Place	11.1
Puyallup at Confluence Right Bank	11.1
Garbage Dump Left Bank	11.3
Golf Course " "	11.7
MURPHY SECTION	
Meridian Bridge	12.6
Cherry Orchard Left Bank	13.0
Old Garbage Dump Left Bank	13.0
Station 166	15.0
CLARKS CREEK BRIDGE Sta. 165 Left Bank	14.8
Station 160p00	14.9
150p00	15.1
140p00	15.3
130p00	15.5
120p00	15.7
110p00	15.9
100p00	16.1
90p00	16.3
80p00	16.5
70p00	16.7
60p00	16.9
50p00	17.1
30p00	17.5
20p00	17.7

Puyallup Right Bank- add 0.1 miles to Distance given for Left Bank.

During the operation of the quarry we hauled away by truck 13,800 cubic yards of waste; also we cast, without hauling, approximately 6200 yards making a total of about 20,000 yards of waste which was disposed of while we were producing about 52,000 yards of rock. This waste was placed in a slough in front of the quarry constructing a floor upon which to operate.

No record was kept of the shovel cost in the handling of this waste because it was accomplished mostly in spare time between the loading of trucks. The cost of truck hire for hauling waste away amounted to \$1252.49 or about nine cents per cubic yard of waste hauled. This cost is buried in the 62 cents per yard of rock to produce, and partly in the \$1.07 per yard of rock to haul.

All in all the Soldiers Home quarry is proving very satisfactory. The character of rock is good, the cost of production is reasonable and the amount of waste necessary to handle is not great. It is anticipated that for some time the character of the rock will improve, the cost of actual production of rock and the disposal of waste may possibly be reduced somewhat. The total cost of rock on the river will depend largely upon the scale of operations under which the work is done. It seems highly probable that the scale of operation for Pierce County will have to be reduced in the coming year in as much as the W P A project is now about completed and the probability of securing additional federal funds is quite remote. The Inter-County River Improvement is in condition, financially, to continue at about the same rate of operation as it has the past year but if the total operation due to a marked reduction in Pierce County requirements is reduced the cost of loading rock at the quarry will be materially increased.

W P A Project: Throughout the year a W P A project has been prosecuted upon our rivers working a very small crew, sometimes as low as ten men and at best reaching about 25 men. The work that this crew has done has been of little importance, the main idea being

to provide W P A with a place to work some of the men who live in this district. Their efforts have been directed largely toward the building of roads for rock trucks, helping in placing the rock, the cutting of brush and disposal of drift in the river bed and in general keeping the channel clear. The contribution with which the Inter-County was credited upon this project was work which we would have done regardless of the project, such as hauling rock and a certain amount specified as supervision under the direction of your Chief Engineer. In other words there was no real outlay for this project on the part of the sponsor.

MUD MOUNTAIN DAM: We are pleased to report that the Corps of Engineers, U. S. Army let the contract for the construction of Mud Mountain Dam about the first of September to the Guy F. Atkinson Company of San Francisco for the sum of \$5,344,605. This contract calls for the completion of the project and making it ready for operation. Excellent progress is being made by the contractor and it is anticipated that the project will be ready for operation for the fall and winter of 1942. The contractor is claiming that he will finish it a year earlier.

This brings to our attention the fact that the Inter-County River Improvement is in agreement to operate this project. While we have deeded all rights of way to the government and the government is assuming the full responsibility of the construction of the project it is not at all impossible that after its completion they will turn it over to us for operation under our agreement. The reasonable certainty of this action has required your engineers to give close attention to this work and as far as possible keep in touch with the needs for, and methods of maintenance, costs of operations, etc. on other similar dams. When completed our dam will be the highest earth fill dam known. The height will be 425 feet and its length along the White River channel 2200 feet. The Government Bulletin explicitly states:-" No earth fill dam has ever been built to a height of 425 feet and in this respect Mud Mountain Dam will be outstanding." It therefore naturally demands our attention, in watching its construction and in perfecting ourselves with knowledge regarding maintenance.

LITIGATION: During the year all pending law suits were disposed of favorably with the exception of the case of McHugh in his suit for \$10,000 damages to a shovel sustained in 1936. This case is now on the Docket in the Superior Court of King County and is to be set for trial in February.

FINANCIAL STATEMENT: The financial statement for December and the year of 1939 follows on next page , designated as Table "B".

RECOMMENDATIONS: It is our recommendation that the work for the coming year be prosecuted along the lines of the past year and that we continue our joint operation of the quarry with the Pierce County Board by the extension of the existing contract.




FINANCIAL STATEMENT  
December 31, 1939

ITEM	EXPENDITURES PREVIOUS MONTHS	EXPENDITURES DECEMBER	EXPENDITURES TO DATE
General Control	\$7,500.05	\$ 885.80	\$8,185.85
Maintenance Equipment	7,106.98	559.38	7,666.36
Pierce County Quarry	183.13	.....	183.13
Pierce County Quarry Job No. 171	10,036.72	2,379.10	12,415.82
Clear Channel Job No. 168	1,805.58	.....	1,805.58
Hauling Rock Job No. 170	24,267.83	3,149.12	27,417.00
Revolving Fund	250.00	.....	250.00
Placing Rock Job No. 175	1,288.88	167.63	1,456.51
Stock Account # 12	122.58	- 3.30	119.28
	<u>52,561.80</u>	<u>6,937.75</u>	<u>59,499.53</u>

	Pierce	King	Total
Expenditures in Previous Months	\$22,880.30	29,881.60	\$ 52,561.90
Expenditures in December	<u>2,911.58</u>	<u>4,026.15</u>	<u>6,937.73</u>
Expenditures to Date.....	25,791.78	33,707.75	59,499.53
Budget Levy	20,000.00	30,000.00	50,000.00
Mud Mountain Reimbursement	6,150.42	8,700.20	14,850.62
Land Sale Dr. Minton	100.00		100.00
Gas Refund to Dec. 1	<u>46.20</u>		<u>46.20</u>
Expenditures to Date	<u>26,296.62</u>	<u>38,700.20</u>	<u>64,996.82</u>
	25,791.78	33,707.75	59,499.53
Balance of Fund as of December 31st	\$504.84	\$ 4,992.45	\$ 5,497.29

Respectfully submitted,

  
B.P. Thomas, Chief Engineer  
Inter-County River Improvement

  
R. H. Thomsen, Consulting Engineer